Foreign bank entry and performance with a focus on Central and Eastern Europe

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Chapter 6
Efficiency. Do Institutions Matter? *

6.1. Introduction

This chapter extends our analysis of the performance of foreign banks. Both chapter 4 and chapter 5 focused on net profit. In this chapter we will turn to efficiency as an indicator of bank performance. Profitability reduces the chance of going bankrupt and allows for paying dividends to the shareholders and for reinvesting in the company. Two ways in which banks can raise profit is by operating more cost efficient and/or more profit efficient. First, banks could improve cost efficiency by reducing the costs per unit of output for a given set of output quantities and input prices. Next, banks could improve profit efficiency by putting together superior combinations of inputs and outputs. This chapter will specifically focus on whether differences in banks' cost efficiency are associated with foreign vs. domestic ownership. In line with the small amount of papers available on this issue, we examine whether, on average, a rise in foreign ownership has positive or negative effects on bank efficiency. Moreover, and more importantly, we investigate to what extent the foreign ownership-bank efficiency relationship depends on the institutional, i.e. the political, legal and regulatory framework of i) the host country, ii) the home country and iii) the difference between the institutional framework in the home and the host countries. To the best of our knowledge, this is the first study available that provides some empirical evidence on this policy relevant topic.

Berger and Humphrey (1997) survey 130 efficiency studies of financial institutions, of which a few address the impact of foreign ownership. Most importantly, the article clearly shows that a general conclusion regarding the efficiency effect of foreign ownership cannot be drawn based on the available empirical literature. My own literature survey (Table 6.1) suggests that foreign banks in transition and developing markets show higher efficiency than their domestically owned counterparts. Also, foreign banks in developed countries exhibit lower efficiency in comparison with domestic banks. For example, Berger et al. (2000) perform an analysis of cross border banking efficiency in France, Germany, Spain, the United Kingdom, and the United States during the 1990s. On average, they find that domestic banks in these countries have both higher cost efficiency and higher profit efficiency than foreign banks operating in the country. However, the authors also find, after disaggregating their results, that foreign banks may be less efficient than foreign banks from most foreign countries, may be about equally efficient with foreign banks from some foreign countries, but may be less efficient than foreign banks from one (the US) of the foreign countries. Thus, the relative efficiency of foreign vs. domestic ownership appears to depend on host and home country conditions. Does foreign and domestic bank efficiency differ, and to

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Table 6.1 Summary of the findings on the efficiency of foreign banks

Authors	Country	Period	Technique	Empirical Findings
DeYoung and Nolle (1996)	US	1985-1990	DFA	Foreign owned U.S. banks are less profit efficient than U.S. owned banks as the former may have placed growth ahead of profitability.
Hasan and Hunter (1996)	US	1984-1989	SFA	Japanese multinational banks operating in the US are significantly less cost and profit efficient than their US counterparts.
Bhattacharya, Lovell and Sahay (1997)	India	1986-1991	DEA	Foreign owned banks are found to be somewhat more efficient than privately owned domestic banks but government owned banks are more efficient than both.
Chang, Hasan, Hunter (1998)	US	1984-1989	SFA	Foreign owned multinational banks are significantly less cost efficient than US owned multinational banks.
Berger et al. (2000)	France, Germany, Spain, UK and USA	1993-1998	DFA	Foreign banks may be less efficient than foreign banks from most foreign countries, may be about equally efficient with foreign banks from some foreign countries, but may be less efficient than foreign banks from one (the US) of the foreign countries.
Grigorian and Manole (2002)	17 European transition nations	1993-2000	DEA	Foreign owned bank are significantly more cost efficient than domestic banks.
Isik and Hassan (2002)	Turkey	1988, 1992, and 1996		Foreign banks seem to be significantly more efficient than their domestic peers.
Jemric and Vujcic (2002)	Croatia	1995-2000	DEA	Foreign banks are significantly more efficient than domestic banks.
Miller and Parkhe (2002)	12 EU countries Arg., UK, Switz., Australia, US, Jap Can., Chile, India,	1989-1996	SFA	US owned banks are more X-efficient than other foreign owned banks in bank-oriented financial systems, but less X-efficient in capital-market oriented systems.
Nikiel and Opiela (2002)	Poland	1997-2000	DFA	Foreign banks are more cost efficient and less profit efficient than other banks.
Yildirim and Philippatos (2003)	12 European transition nations	1993-2000	SFA and DFA	Foreign banks are more cost efficient but less profit efficient than domestically owned private banks and state-owned banks.

Hasan and Marton (2003)	Hungary	1993-1997	SFA	Foreign banks and banks with higher foreign ownership involvement are associated with lower inefficiency.
Matousek and Taci (2004)	Czech Republic	1993-1998	DFA	Foreign banks are more cost efficient than other banks, although their efficiency has been comparable with the good small banks in early years of operations.
Weill (2003)	Czech Republic and Poland	1997	SFA	Foreign banks are more cost efficient than domestic banks. This advantage does not result from differences in the scale of operations or the structure of activities.
Green, Murinde Nikolov (2004)	9 European transition nations	1995-1999	System of equations	Foreign banks are not more efficient than domestic banks. Foreign ownership does not significantly reducing banks costs.
Sturm and Williams (2004	Australia	1988-2001	DEA	New foreign banks are more input efficient than domestic banks, mainly due to their superior scale efficiency.
Bonin, Hasan, Wachtel (2005)	11 European transition nations	1996-2000	SFA	Foreign owned banks are more cost efficient than other private banks.
Fries and Taci (2005)	15 European transition nations	1994-2001	SFA	Privatised banks with majority foreign ownership are the most efficient and those with domestic ownership are the least.
Havrylchyk (2006)	Poland	1997-2001	DEA	Foreign banks are more efficient than domestic owned banks.
Zajc (2006)	6 CEE nations	1995-2000	SFA	Foreign banks are less cost efficient than domestic banks.

what extent is foreign bank efficiency affected by the institutional difference of the host country and similarities between host and home countries' legal and regulatory frameworks? Theory suggests that there are some inherent attributes of foreign banks that limit their performance vis-à-vis domestic banks. Berger *et al.* (2000) differentiate between home field advantages and global advantages. The *global advantage* hypothesis states that foreign banks might benefit from competitive advantages relative to their domestic owned peers. Foreign-owned banks use more advanced technologies due to a stiff home market competition. Foreign banks might also become more competitive relative to domestic banks due to an active market for corporate control in the home country and because they have access to an educated labour force with the ability to adapt to new technologies. Similarly, Havrylchyk (2006) suggests that foreign banks might profit from better risk management and reliance on modern information technologies. The *home field advantage* hypothesis predicts foreign banks to suffer from disadvantages relative to domestic banks. Foreign-controlled banks are assumed to underperform domestically controlled banks due to higher costs of providing the samefinancial services or lower revenues, from problems in providing the same quality

and variety of services as domestic institutions. Hymer (1976) argues that foreign firms are likely to face competitive disadvantages relative to national firms. The latter have the general advantage of better information about their country's economy, language, laws and politics. This leads to the hypothesis that foreign banks suffer more from a bad institutional framework in the host country than domestic banks. Foreigners and nationals may receive very different treatment from governments, consumers and suppliers. If this hypothesis holds, the foreign ownership-bank efficiency relationship will *e.g.* differ for countries that score high or low on a good institutional framework. In countries with a good institutional framework, the impact of foreign ownership on bank efficiency will be less negative or more positive than in countries where the institutional framework is bad. Mian (2006) develops a theoretical model that provides some ideas about the effect of *institutional distance* on foreign bank behaviour. He assumes *e.g.* that *institutional distance* between the home country and the host country will cause higher informational, agency, or enforcement costs for foreign banks operating abroad. Mian states "Working in an environment with a different corporate culture, legal environment, or regulatory frame work might increase the asymmetry in information and make it more difficult for the CEO of a foreign bank to design policies that are specifically tailored for the developing country" (Mian, 2006, p. 1470).

This chapter examines the effect of the institutional framework on the foreign ownership-bank efficiency relationship by using stochastic frontier analysis for a broad sample of 1363 banks in 93 countries. It explores the issue by addressing four related questions: (i) What is the effect of foreign ownership on bank inefficiency? (ii) What is the effect of the institutional framework in the host country on this relationship? (iii) What is the effect of institutional difference between the host and the home country on the inefficiency of foreign banks? (iv) What is the effect of the institutional framework in the home country on the inefficiency of foreign banks? We will show that, on average, foreign ownership has a negative effect on bank efficiency. More importantly, we provide empirical evidence for the hypothesis that in countries with a good regulatory environment and good governmental governance, the bank efficiency reducing effects of a rise in foreign ownership are considerably lower. Third, we find that higher quality of the home countries' institutional framework reduces foreign bank inefficiency. Fourth, the smaller the *institutional distance* between the host and the home country, the lower is foreign bank inefficiency.

The chapter is organised as follows. Section 6.2 presents the econometric framework and Section 6.3 the data. In Section 6.4 we present the results of our empirical investigation. Section 6.5 concludes.

6.2 Econometric framework

6.2.1 Assumptions of the model

In line with Berger and Mester (1997) we measure cost efficiency (technical efficiency) as how close a bank's cost is to what best practice banks cost would be for producing

the same output bundle under the same conditions. As costs functions are not directly observable, inefficiencies are measured relative to an efficient cost frontier. Most studies on the impact of foreign ownership on cost efficiency use data envelopment analysis (DEA) or stochastic frontier analysis (SFA). We use stochastic frontier analysis as it controls for measurement error and other random effects[1]. More specifically, we use the Battese and Coelli (1995) SFA model, henceforth the BC model. A first advantage of the BC model over the standard two-step SFA approach of Aigner, Lovell and Schmidt (1977) and Meeusen and van den Broeck (1977) is that the former estimates the cost-frontier and the coefficients of the efficiency variables simultaneously[2]. Wang and Schmidt (2002) show that the two-step approach suffers from the assumption that the efficiency term is independent identical half-normally distributed in the first step, while in the second step the efficiency terms are assumed normally distributed and dependent on the explanatory variables. This method inherently renders biased coefficients. A second advantage of the BC model is that it has the ability of estimating with an unbalanced panel dataset. Using an unbalanced panel leads to an increase of observations.

The general BC model specifies a stochastic cost frontier with the following properties:

$$\ln C_{i,t} = C(y_{i,t}, w_{i,t}, q_t; \beta) + u_{i,t} + \nu_{i,t} \qquad (6.1)$$

Where $C_{i,t}$ is the total cost bank i faces at time t and $C(y_{i,t}, w_{i,t}; \beta)$ is the cost frontier. In this model bank efficiency is measured relative to a global best-practice frontier. The advantage of this approach is that a frontier formed from the complete data set across nations allows for a better comparison across nations (Berger and Humphrey, 1997). However, cross-country comparisons are difficult to interpret because the regulatory and economic environments faced by financial institutions are likely to differ importantly across nations. In our analysis, we therefore specifically control for such cross-country differences in economic and financial environment when estimating the efficiency frontier.

Within the cost frontier, $y_{i,t}$ represents the logarithm of output of bank i at time t, $w_{i,t}$ is a vector of the logarithm of input prices of bank i at time t, q are country specific variables and β is a vector of all parameters to be estimated. The term $u_{i,t}$ captures cost inefficiency and is independent identical distributed with a truncated normal distribution.[3] $\nu_{i,t}$ captures measurement error and random effects, e.g. good

1 Non-parametric techniques do not allow for measurement error and luck factors, thus attributing any deviation from the best-practice bank to technical inefficiency. For a more extensive review of the non-parametric and the parametric approach we refer to Matousek and Taci (2004).

2 Kumbhakar and Lovell (2000) discuss other SFA models that also solve for exogenous influences on efficiency simultaneously. Coeli (1996) has implemented the BC model into a statistical software package FRONTIER Version 4.1.

3 Thus, the total costs a bank faces are never lower than the costs of the frontier. For a graphical

and bad luck, and is distributed as a standard normal variable. Both $u_{i,t}$ and $\nu_{i,t}$ are time and bank specific and represented as[4]:

$$u_{i,t} \sim \mathcal{N}^{+}(m_{i,t}, \sigma_{\upsilon}^{2}) \text{ and } \nu_{i,t} \sim iid\mathcal{N}(0, \sigma_{\nu}^{2}) \tag{6.2}$$

$$m_{i,t} = \delta_0 + \sum_{n} \delta_{n,i,t} z_{n,i,t} \tag{6.3}$$

Equation (6.3) models inefficiency and its explanatory variables. The z in Equation (6.3) represents the vector of n variables that drive the inefficiency (m) of bank i at time t. The deltas represent the coefficients. Equations (6.1) and (6.3) are solved in one step by using maximum likelihood.

6.2.2 Specification of the model

We select a transcendental logarithmic form for the cost function as developed by Christensen, Jorgenson, and Lau (1973). We use this specification since it results in a better fit of the frontier than e.g. the Cobb-Douglass form (Kumbhakar and Lovell, 2000)[5]. A time trend is included in the function to allow for changes in technology over time. Since a translog function is a second order approximation, a trend is included with a t and t^2 term (Coelli, Rao, and Battese, 1998). In line with the general model we specify the cost function as:[6]

$$\begin{aligned}
\ln\left(\frac{TC}{PL}\right) = \beta_0 + \beta_1 \ln\left(\frac{PF}{PL}\right) &= \beta_2 \ln(loans) + \beta_3 \ln(securities) + \beta_4 \frac{1}{2}\left(\ln\left(\frac{PF}{PL}\right)\right)^2 \\
&+ \beta_5 \frac{1}{2} (\ln(loans))^2 + \beta_6 \frac{1}{2} (\ln(securities))^2 + \beta_7 \ln\left(\frac{PF}{PL}\right) \ln(loans) \\
&+ \beta_8 \ln\left(\frac{PF}{PL}\right) \ln(securities) + \beta_9 \ln\left(\frac{PF}{PL}\right) Year + \beta_{10} \ln(loans) \ln(securities) \\
&+ \beta_{11} \ln(loans)\, Year + \beta_{12} \ln(securities) * Year + \beta_{13} Year + \frac{1}{2}\beta_{14} Year^2 \\
&+ \beta_{15} GDPPC + \beta_{16} r + \beta_{17} concentrationrate + \beta_{18} \frac{privatecredit}{GDP} \\
&+ \beta_{19} \frac{LLR}{grossloans} + \beta_{20} \frac{otheroperationgincome}{totalassets} + u_{i,t} + \nu_{i,t}
\end{aligned} \tag{6.4}$$

representation of the frontier and its dynamics see Berger et al. (1993). The authors show how inefficiency is determined by allocative inefficiency and technical inefficiency.

4 Testing for heteroskedasticity of the inefficiency term (u) is impossible as we use an unbalanced panel. The CB model lacks providing values of the residuals, impeding conclusions on heteroskedasticity of (v).

5 The Fourier flexible form is even more general than the translog production function. However, the results of both are more or less in line with each other (Berger and Mester, 1997).

6 In contrast to Fries and Taci (2005) we scale total costs and the input price by one price, personnel expenses, in order to guarantee linear homogeneity of the cost function (see Kuenzle, 2005). Total costs include interest expenses, personnel expenses and other operating expenses.

The dependent variable of the cost function is total costs (*TC*) and includes labour, interest, and other costs. Furthermore the specification assumes two input prices and two output quantities. The first input price is the price of funds (*PF*). This price is defined as the ratio of a bank's interest costs, scaled by the sum of deposits and other interest bearing funding. The second input price is the price of labour (*PL*) and is the ratio of personnel expenses, scaled by total assets. Although scaling over total employees instead of total assets gives a better proxy of price of labour, the latter is chosen since for many observations the former is not available. In order to guarantee linear homogeneity in input prices of the cost function, we scale *TC* and *PF* by *PL*. This scaling implies an estimation of coefficients for *PF* as well as *PL* with the restriction that the sum of these coefficients is equal to one (see Kuenzle, 2005). The output quantities used are total loans (*Loans*) and total securities (*Securities*).

In estimating one best-practice frontier for all banks we control for country-specific and bank-specific variables. By allowing these variables to influence the position of the efficient cost frontier we control for the fact that technological influence and service qualities can vary systematically across countries. Simply pooling all banks across countries would implicitly assume that efficiency differences across banks are attributed entirely to managerial decisions within banks regarding the scale and mix of inputs. Country specific control variables include the level of economic development, proxied by GPD per capita (*GDPPC*), nominal interest (r), banking market concentration[7] and development of the financial sector, proxied by the ratio of credit to the private sector over GDP (*private credit/GDP*).[8]

On bank level, we control for bank risk and the output quality as unmeasured differences in product quality may be incorrectly measured as differences in cost inefficiency. As a measure of risk we used loan loss reserves over gross loans (*LLR/ gross loans*). We control for variation in banking service qualities by including the ratio of banks' other operating income over total assets (*other operating income/total assets*). We also control for year effects.

For the entire sample, including domestic and foreign banks, we use two specifications of the (in)efficiency equation. The first specification is as follows:

$$m_{it} = \delta_0 + \delta_1 \frac{Equity}{Totalassets} + \delta_2 Foreign \qquad (6.5)$$

We use this specification to test whether foreign ownership, measured by *Foreign*, has

7 Miller and Parkhe (2002) find that foreign bank efficiency is strongly influenced by the competitiveness of its home country and the host country in which it operates. Concentration ratios for 1998-2001 are calculated as the sum of assets of the three largest banks over the assets of all banks per country.

8 GDP per capita, nominal interest and credit to the private sector figures for 1998-2003 are from the World Bank World Development Indicators 2005. The intermediation ratio reflects differences among the banking sectors in terms of the extent to which they convert deposits into loans, which may be associated with bank holdings of government securities and crowding out of private borrowing by the public sector (Fries and Taci, 2005).

a positive or a negative effect on efficiency. Note that a positive δ_2 implies that an increase in *Foreign* is associated with an increase in inefficiency. We include the equity position of a bank, measured by (*Equity/Total Assets*) since the failure to account for the equity position of a bank seems to yield a strong scale bias making large banks more efficient than small banks by virtue of the equity they have built up over time (Berger and Mester, 1997) [9].

We use a second specification to test whether the efficiency-foreign ownership relationship depends on the institutional framework in the *host* country ($Inst_{host}$). This specification reads as follows:

$$m_{it} = \delta_0 + \delta_1 \frac{Equity}{Totalassets} + \delta_2 Foreign + \delta_{i=3..8} Foreign*Inst_{host,j} \quad (6.6)$$

Inst denotes a vector of six institutional indicators, to be explained in the next section. The different institutional indicators are included one by one in the equation, which implies that we estimate six different models.

Next, we continue by only considering a reduced sample: a sample of foreign banks only.[10] For this sample, we also specify two types of efficiency equations. First, we estimate the effect of institutional similarity (*Similarity*) between the home and the host country and the institutional framework in the *home* country ($Inst_{home}$),

$$m_{it} = \delta_0 + \delta_1 \frac{Equity}{Totalassets} \delta_2 Similarity + \delta_{i=3..8} Inst_{home,j} \quad (6.7)$$

where similarity measures institutional distance between the home and host country. For exact measurement of this variable, see section 6.3. Nest, we estimate the effect of institutional similarity between the home and the host country and the institutional context in the *host* country:

$$m_{it} = \delta_0 + \delta_1 \frac{Equity}{Totalassets} \delta_2 Similarity + \delta_{i=3..8} Gvrnnce_{host,j} \quad (6.8)$$

6.3 Data

The sample we use is based on data availability. The entire sample includes 1363 commercial banks in 93 countries. All bank level data are from the BankScope database produced by Bureau van Dijk, which covers 90% of banks worldwide. We use the 2006 BankScope issue for *PF, PL, TC, other operating income, equity, LLR, loans* and *securities*. One of the main variables in the analysis is foreign ownership (*Foreign*).

9 Insolvency risk affects costs and profits via the risk premium the bank has to pay for uninsured debt. Moreover, if some banks are more risk averse than others, the former may hold a higher level of equity than maximizes profits or minimizes costs (Berger and Mester, 1997).

10 A foreign bank is defined as a bank of which more than 50% of the shares are owned by non-domestic resident.

Most studies on foreign banking use a foreign ownership dummy, a zero-one dummy, which defines a bank to be foreign if more than 50% of the total stock of shares is held by non-domestic residents. Since we are primarily interested in the effect of an increase in foreign ownership of efficiency, we decided to use a continuous variable foreign ownership, defined as the percentage of shares held by foreigners. Conceptually, this implies that we examine the effects of a rise in foreign ownership on efficiency, rather than the differential effect of foreign vs. domestic banks on efficiency. In alternative tests, for reasons of space not presented, we used a foreign bank dummy in line with the literature. This, however, gave qualitatively the same results, which is not surprising, since the bank ownership data appeared to be skewed, in the sense that most banks either have a very large or a very low percentage of foreign ownership, and hence the variable *Foreign* behaves like a foreign bank dummy. A problem we were confronted with is that ownership data provided by BankScope are not complete in that for almost all banks part of ownership information is missing. To come around this problem, we include only those banks for which ownership is given for at the least 75% of the shares. Moreover, in the case where part of the ownership information was missing, we rescaled the ownership variables in such a way that foreign and domestic ownership add up to 100%. Another problem we were faced with is that each edition of BankScope only provides information on the last available information on ownership distribution, and hence ownership for a bank does not vary over time. To account for changes in ownership distribution per bank over time, we supplement the data with ownership information of the 1998, 1999, 2000, 2001, 2002 and 2003 editions of BankScope. Descriptive information on all bank level variables is given in Appendix 14. This table suggests that the sample is biased in that there is an overrepresentation of banks from developed countries included in the sample. In order to test to what extent our results are driven by our sample, we re-estimated all equations for a smaller sample only including banks from countries with a GDP per capita lower than $10,000. Qualitatively this gave the same result.

The cost function we estimate also includes macro variables, such as GDP per capita, the nominal interest rate and the ratio of domestic credit to the private sector over GDP. These data are extracted from the World Bank World Development Indicators 2005. The nominal interest rate is calculated using the real interest rate and the GDP deflator. Descriptive statistics for the country variables are also included in Appendix 14.

The main aim of the analysis is to see to what extent the relationship between efficiency and foreign-ownership depends on the *institutional framework of the host country*, the *institutional similarity* between the home and the host country and the *institutional framework of the home country*. We decided to use the six institutional indicators as developed by Kaufmann *et al.* (2005). These indicators all measure another aspect of the institutional context of a country. The aggregate institutional indicators from Kaufman et al. (2005) cover 209 countries and territories for 1996, 1998, 2000, 2002 and 2004 and are based on 352 individual variables measuring perceptions of the institutional context, taken from 37 separate data sources. For the years that

are in between, we take the averages of the year before and after. Perceptions of the institutional context include (i) the process by which governments are selected, monitored and replaced. (ii) the capacity of the government to effectively formulate and implement sound policies, and (iii) the respect of citizens and the state for the institutions that govern economic and social interactions among them. The first cluster includes Voice and Accountability (*VAC*), and Political instability and Violence (*PIV*), the second Government Effectiveness (*GEF*) and Regulatory Quality (*REG*), and the third cluster includes Rule of Law (*LAW*) and Control of Corruption (*COR*). Table 6.2 provides exact definitions of the institutional indicators we use in the analysis.

The gains for foreign banks of a better institutional environment come through various channels of transmission. Regarding the relevance of the *voice and accountability* indicator, we expect a higher level of media independence to increase the quality of information on local developments. As the owners of foreign banks might have more trouble interpreting local information this would especially benefit foreign banks. An increase in political rights could allow for the establishment of labour unions. If working conditions in foreign banks are better than in domestic banks, due to higher standards of foreign banks, the establishment of unions could diminish the relative cost disadvantage of foreign banks.

Table 6.2 Institutional indicators

Institutional indicator	Definition
Voice and accountability	Measures the various aspects of the political process, civil liberties, political rights, and independence of the media.
Political stability and violence	Measures of perceptions of the likelihood that the government in power will be destabilized or overthrown by possibly unconstitutional and/or violent means, including domestic violence and terrorism.
Government effectiveness	Responses on the quality of public service provision, the quality of the bureaucracy, the competence of civil servants, the independence of the civil service from political pressures, and the credibility of the government's commitment to policies.
Regulatory quality	Measures of incidence of market-unfriendly policies such as price controls or inadequate bank supervision, as well as perceptions of the burdens imposed by excessive regulation in areas such as foreign trade and business development.
Rule of law	Measures the extent to which agents have confidence in and abide by the rules of society. These include perceptions of the incidence of crime, the effectiveness and predictability of the judiciary, and the enforceability of contracts.
Control of corruption	Measures the exercise of public power for private gain, including both petty and grand corruption and state capture.

Source: Kaufman et al. (2005)

Second, *better political stability and violence* could be beneficial especially for foreign banks if they are more risk-avers and have relatively high loan loss provisions. Mian (2006) reviews the idea on why domestic and foreign banks have different risk preferences. The author assumes that domestic banks may be more willing to take on higher levels of risk because of the moral hazard or option values associated with the limited liability of banks. Foreign banks on the other hand, may not be willing to take such high levels of risk because of their 'franchise value' at risk, and the added supervision by their home regulatory authority (Mian, 2006). Higher political stability and less violence could also lower foreign banks' security costs assuming that foreign institutions run a higher risk of becoming a victim of violence.

Better *government effectiveness* reduces costs of foreign banks as foreign banks are assumed to face more difficulty in dealing with local bureaucracy. Higher independence of the civil service from political pressure lowers foreign banks' costs in those countries where political pressure against (entry of) foreign banks is prevailing.

Improvements in the *regulatory quality* help foreign banks if it is accompanied by more adequate banking supervision. For example, foreign banks in Poland have been faced with very strict regulation: banks were forced to provision for loans even when it was certain that the loans would be repaid –for example by the parent company of the borrowing subsidiary- (section 3.1). In addition, foreign banks could spend less time on excessive regulation to which they might be less familiar than their local domestically owned competitors. Weill and Pruteanu-Podpiera (2006) refer to the lack of prudential regulation in the Czech Republic in the period 1989-1993.

The quality of the *rule of law* affects cost efficiency through the effectiveness and predictability of the judiciary. When going to court is time consuming, bank costs face downward potential. For example, representatives of foreign banks have argued that the legal system in Central and Eastern Europe does not always work in the most efficient way and that in the mid 1990s it took years to realize collateral on real estate in the Czech Republic (section 3.4.1). Finally, enhanced *control of corruption* influences costs by lowering the costs of bribing. We assume that foreign institutions in particular are subject to corrupt legal or public officers. Thus, we hypothesize that a better institutional framework, i.e. higher values of the six institutional indicators, lowers foreign bank cost inefficiency.

Descriptive statistics for home and host country institutional indicators are given in Appendix 14. Table 6.3 gives a correlation matrix of the explanatory variables of bank efficiency for the complete set. Since the institutional indicators are highly correlated, they are separately included in the different specifications.

To test for the relevance of the (dis)similarity between the institutional environment between the host and the home country for foreign bank efficiency, we introduce the variable *institutional similarity*. This variable is calculated as the correlation between the six home and the six host country institutional indicators. The home country refers to the origin of bank (or investor) with a physical establishment, the foreign owned bank, in another country: the host country. We expect higher values of institutional similarity to lower bank inefficiency. The correlation matrix of the variables used in

estimations with the reduced set, the set of foreign banks only, is in appendix 15.

Table 6.3 Correlation matrix of efficiency correlates

	EQ/TA	FOR	VAC	PIV	GEF	REG	LAW	COR
EQ/TA	1							
FOR	0.168	1						
VAC	0.025	-0.040	1					
PIV	0.064	0.066	0.775	1				
GEF	0.021	-0.013	0.822	0.813	1			
REG	-0.018	-0.007	0.792	0.774	0.908	1		
LAW	0.006	-0.024	0.824	0.851	0.977	0.907	1	
COR	0.017	-0.021	0.832	0.825	0.975	0.894	0.982	1

EQ/TA is the ratio of bank equity over total assets. FOR is the variable measuring foreign bank ownership. The variable is determined as the percentage of shares owned by foreign investors. The institutional indicators include voice and accountability (VAC), political instability and violence (PIV), government effectiveness (GEF), rule of law (LAW) and control of corruption (COR). Definitions are in Table 6.2.

6.4 Empirical results

Table 6.4 shows the estimation results for effect of foreign ownership on bank efficiency and the impact of the institutional context of the host country on this relationship. The estimates of the cost frontier for the different specifications are given in Appendix 16. In the discussion of the results we focus on the inefficiency correlates. Results for the *foreign* variable in specifications 1-7 (Table 6.4) confirm that an increase in foreign ownership positively affects bank inefficiency. An important finding is that this conclusion holds for the set of developed countries as well as for the set of transition and developing countries. Second, the significant coefficients with negative sign of the interactive variables show that in *host* countries that score high on the institutional indicators, the negative effect of a rise in foreign ownership on bank efficiency decreases. This holds for all institutional indicators used. We interpret this result as a first empirical justification for the hypothesis that foreign banks may find it difficult to deal with host country's regulations, banking supervision rules, local judiciary in general and corruption and that especially in countries where the institutional environment is bad, the foreign ownership-bank efficiency relationship is negative. The LR-tests indicate that (in)efficiency has a significant impact on the model. Table 6.5 shows the results for the relevance of foreign banks' institutional environment in the *home* country on efficiency. The estimation of the pertaining cost functions is given in appendix 17. The SFA is performed with foreign banks only. A shift in focus of the institutional context is made. Instead of looking to the host country institutional context, the home country institutional context is used for the estimation. The home country is the country in which most of the stocks are held. All

institutional indicators used have a negative estimate. This means that the better the institutional context in the home country, the less inefficient a foreign bank performs. As the similarity variable has a negative estimate, foreign bank inefficiency reduces as similarity between the home and the host country's institutions rises. Also for these models (in) efficiency has a seriously impact, given the LR-tests. Table 6.6 shows the estimates of an extended model that is used for the results in table 4. In this model the institutional context in the host country is also taken into account. The cost functions underlying these models are given in appendix 18. The results are similar to those presented in table 6.4. The added variable of host institutions has also a negative sign, which means that efficiency increases as the institutional context in the host country improves. In conclusion this means that the institutional context in the home as well as the host country is important for bank efficiency.

6.5 Conclusion

Despite the extant literature on the determinants of bank efficiency, there is little information on the impact of foreign ownership. Moreover, there are no studies that have examined to what extent the foreign ownership-efficiency relationship depends on the institutional context in the home and/or the host country. Mian (2006) suggests that institutional differences between the host and the home country will cause higher informational, agency or enforcement costs for foreign banks operating abroad. We examine six indicators that capture three areas of the institutional environment: (i) the process by which those in authority are selected and replaced, (ii) the ability of the government to formulate and implement sound policies and (iii) the respect of citizens and the state for the institutions which govern their interaction. The analysis of this chapter leads to four conclusions. First, on average foreign banks are less efficient than domestic banks. This result holds for the estimations with the set of banks world wide as well as for estimations with the set of banks in countries with GDDP per capita below $10,000, i.e. the set of transition economies and lower middle income and low income countries. Thus, we find evidence for the home advantage theory both in developed as in developing countries. This finding contrasts with the findings of previous efficiency studies that foreign banks are more efficient in transition economies. Second, a bad institutional context in the host country affects foreign bank efficiency more than domestic bank efficiency. Third, higher institutional difference between the host and the home country lowers the efficiency of foreign banks. Fourth, enhanced home country institutions positively affect the efficiency of foreign banks. Our main results seem to hold for all institutional indicators introduced. Thus, in accordance with Main (2006) our study finds convincing evidence for the relevance of the institutional environment in explaining differences between foreign and domestic banks. Further research could be directed on whether the institutional environment affects state-owned banks and private domestic banks in the same way.

Table 6.4a Bank inefficiency: ownership and host country institutions (all countries)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Number of observations	3,850	3,850	3,850	3,850	3,850	3,850	3,850
Correlates with bank inefficiency							
Constant	-10.92	-8.86	-11.31	-8.91	-9.55	-11.38	-10.63
	(-8.3)***	(-23.47)***	(-7.28)***	(-20.29)***	(-22.67)***	(-11.63)***	(-11.21)***
EQ	-5.91	-6.02	-5.75	-6.04	-5.82	-5.26	-5.91
	(-10.86)***	(-16.11)***	(-8.67)***	(-6.65)***	(-27.5)***	(-13.38)***	(-13.28)***
FOREIGN	1.45	1.57	1.72	1.78	2.36	1.94	2.16
	(15.45)***	(19.23)***	(18.91)***	(13.16)***	(26.34)***	(19.73)***	(26.79)***
Voice and accountability Host * Foreign		-0.35					
		(-6.82)***					
Political instability and violence Host * Foreign			-0.43				
			(-4.69)***				
Government effectiveness Host * Foreign				-0.45			
				(-9.04)***			
Regulatory quality Host * Foreign					-1.19		
					(-17.85)***		
Rule of law Host * Foreign						-0.58	
						(-8.62)***	
Control of corruption Host * Foreign							-0.82
							(-7.23)***
Sigma-squared	4.13	3.30	4.26	3.32	3.51	4.11	4.01
	(9.61)***	(27.02)***	(8.71)***	(22.73)***	(26.03)***	(12.97)***	(12.13)***
Gamma	0.99	0.99	0.99	0.99	0.99	0.99	0.99
	(1073.2)***	(1022.5)***	(814.4)***	(1814.4)***	(1161.2)***	(904.75)***	(1238.8)***
LR-test[1]	931.26***	929.20***	931.97***	930.52***	936.44***	932.27***	938.34***

The sample includes foreign and domestic banks. Estimations for the cost frontier are in Appendix 16. * significant at 0.1 level; ** significant at 0.05 level; *** significant at 0.01 level. Sigma-squared, Gamma, and the LR-test give some information about the fit of the model. An explanation is given in Appendix 19.

Table 6.4b Bank inefficiency: ownership and host institutions (low-income countries)

	(1)	(2)	(3)	(4)	(5)	(6)
Number of observations	1810	1810	1810	1810	1810	1810
Correlates with bank inefficiency						
Constant	-10.77	-9.99	-8.32	-8.05	-8.22	-8.40
	(-5.36)***	(-3.84)***	(-5.57)***	(-4.64)***	(-4.85)***	(-3.84)***
EQ	-5.40	-5.69	-6.10	-6.16	-6.14	-6.06
	(-8.67)***	(-7.92)***	(-8.07)***	(-6.75)***	(-7.01)***	(-5.61)***
FOREIGN	1.47	1.17	1.29	1.66	1.18	0.98
	(14.22)***	(10.8)***	(6.47)***	(5.63)***	(5.62)***	(4.49)***
Voice and accountability Host *Foreign	-1.03					
	(-5.16)***					
Political instability and violence Host *Foreign		-0.001				
		(-0.02)				
Government effectiveness Host *Foreign			-1.00			
			(-5.81)***			
Regulatory quality Host * Foreign				-1.74		
				(-5.66)***		
Rule of law Host * Foreign					-0.55	
					(-3.78)***	
Control of corruption Host * Foreign						-1.71
						(-4.48)***
Sigma-squared	3.90	3.67	3.11	3.02	3.08	3.13
	(5.97)***	(4.4)***	(6.45)***	(5.4)***	(5.61)***	(4.44)***
Gamma	0.98	0.98	0.98	0.98	0.98	0.98
	(303.51)***	(240.43)***	(303.39)***	(257.68)***	(256.3)***	(211.38)***
LR-test	346.12***	344.71***	344.17***	349.21***	343.78***	348.95***

The sample includes foreign and domestic banks. Estimations for the cost frontier are in Appendix 16. * significant at 0.1 level; ** significant at 0.05 level; *** significant at 0.01 level. Sigma-squared, Gamma, and the LR-test give some information about the fit of the model. An explanation is given in Appendix 19.

Table 6.5 Foreign bank inefficiency: institutional similarity and home institutions

	(1)	(2)	(3)	(4)	(5)	(6)
Number of observations	1,385	1,385	1,385	1,385	1,385	1,385
Correlates with bank inefficiencies						
Constant	-4.46	-5.42	-7.71	-4.38	-7.40	-5.03
	(-4.13)***	(-3.67)***	(-3.51)***	(-3.36)***	(-3.86)***	(-3.47)***
Bank specific variables						
Equity/ total assets	-8.25	-8.86	-7.68	-8.22	-7.79	-8.49
	(-6.59)***	(-5.68)***	(-8.08)***	(-5.31)***	(-8.93)***	(-5.27)***
Institutional context home-host country						
Institutional similarity	-0.50	-0.51	-0.54	-0.44	-0.55	-0.45
	(-4.64)***	(-4.14)***	(-4.77)***	(-3.77)***	(-5.03)***	(-3.85)***
Institutional context home country						
Voice and accountability Home	-0.72					
	(-4.84)***					
Political instability Home		-0.75				
		(-4.15)***				
Government effectiveness Home			-0.58			
			(-5.21)***			
Regulatory quality Home				-0.70		
				(-3.78)***		
Rule of law home					-0.56	
					(-5.11)***	
Control of corruption Home						-0.43
						(-3.93)***
Sigma-squared	2.44	2.80	3.67	2.45	3.48	2.63
	(5.39)***	(4.6)***	(4.33)***	(4.33)***	(5.34)***	(4.38)***
Gamma	0.98	0.98	0.98	0.98	0.98	0.98
	(212.27)***	(188.03)***	(214.98)***	(167.06)***	(307.08)***	(163.25)***
LR-test	236.87***	236.58***	237.14***	235.97***	236.78***	234.79***

The sample consists of foreign banks only. Estimations for the cost frontier are in Appendix 17. * significant at 0.1 level; ** significant at 0.05 level; *** significant at 0.01 level. Sigma-squared, Gamma, and the LR-test give some information about the fit of the model. An explanation is given in Appendix 19.

Table 6.6 Foreign bank inefficiency: institutional similarity and country institutions

	(1)	(2)	(3)	(4)	(5)	(6)
Number of observations	1,385	1,385	1,385	1,385	1,385	1,385
Correlates with bank inefficiencies						
Constant	-4.44	-5.53	-3.67	-5.40	-4.51	-4.31
	(-3.22)***	(-7.67)***	(-3.69)***	(-4.48)***	(-3.97)***	(-3.19)***
EQ	-7.50	-8.21	-7.16	-6.70	-7.63	-7.05
	(-4.93)***	(-24.77)***	(-6.42)***	(-8.03)***	(-6.68)***	(-5.53)***
Institutional similarity	-0.51	-0.47	-0.19	-0.21	-0.20	-0.08
	(-3.86)***	(-6.57)***	(-2.52)**	(-1.02)	(-2.68)***	(-1.18)
Institutional context home						
Voice and accountability Home	-0.72					
	(-3.41)***					
Political instability and violence Home		-0.72				
		(-8.42)***				
Government effectiveness Home			-0.50			
			(-4.62)***			
Regulatory Burden Home				-0.76		
				(-5.29)***		
Rule of law Home					-0.50	
					(-4.95)***	
Control of corruption Home						-0.44
						(-3.91)***
Institutional context host country						
Voice and Accountability Host	-0.52					
	(-3.6)***					
Political stability Host		-0.44				
		(-5.77)***				
Government effectiveness Host			-0.68			
			(-5.28)***			

	(1)	(2)	(3)	(4)	(5)	(6)
Regulatory quality Host				-1.33		
				(-7.9)***		
Rule of law Host					-0.68	
					(-5.7)***	
Control of corruption Host						-0.86
						(-4.44)***
Sigma-squared	2.53	2.88	2.31	3.19	2.62	2.51481
	(4.07)***	(10.28)***	(5.1)***	(6.55)***	(5.29)***	(4.24)***
Gamma	0.98	0.98	0.97	0.982426	0.98	0.98
	(163.63)***	(404.16)***	(186.73)***	(383.41)***	(230.3)***	(178.03)***
LR-test	240.27***	239.31***	238.26***	248.06***	238.87***	243.49***

The sample consists of foreign banks only. Estimates for the cost frontier are in Appendix 18. *, **, *** significant at the 0.1, 0.05, and 0.01 level. Sigma-squared, Gamma, and the LR-test give some information about the fit of the model. An explanation is given in Appendix 19.